Ministry of Economic Affairs and Climate Policy

Lower Carboniferous

A virtually untested play

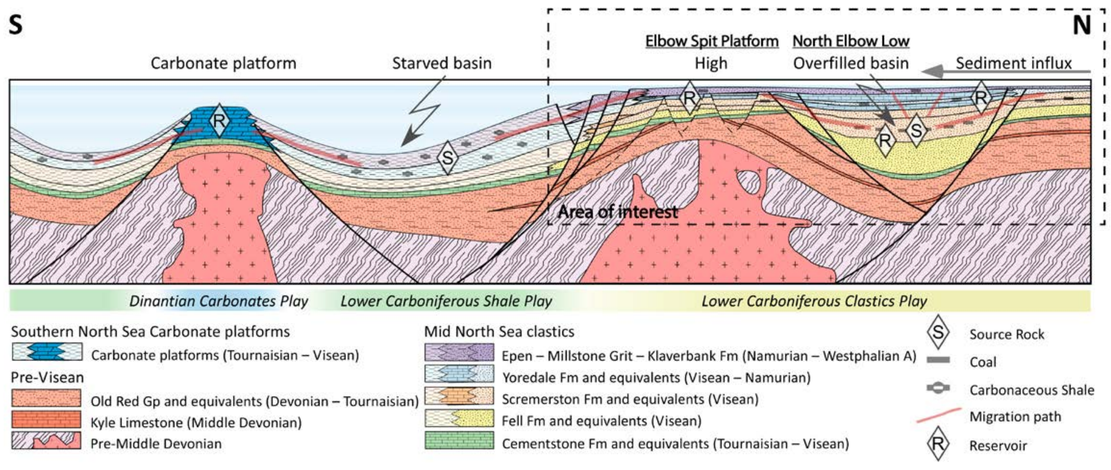

Figure 1. Diagram illustrating the structural geology and play elements of the Visean and Namurian in the Mid North Sea area. The Elbow Spit Platform is an example of a high, while the North Elbow Low is an example of an overfilled basin (Ter Borgh et al., 2018).

Play elements of the Lower Carboniferous plays

The **Visean and Namurian deposits** in the northern Dutch offshore have significant hydrocarbon potential:

- **20 structures** have been identified on the Base Permian Unconformity (BPU) depth map, all **4-way dip or fault dip closures**. Provisional P50 GIIP's add up to ~75 BCM (unrisked)
- The Lower Carboniferous clastics play is established in the UK part of the southern North Sea. The UK fields are producing from Namurian and Visean reservoirs (e.g. Breagh field development)
- From well reviews it is concluded that the play is **virtually untested** in the northern Dutch offshore

Reservoir

- **Visean and Namurian reservoir rocks** are present throughout the study area
- Abundance and thickness of sands with reservoir quality increase from Breagh (well 42/13-2) towards the northeast

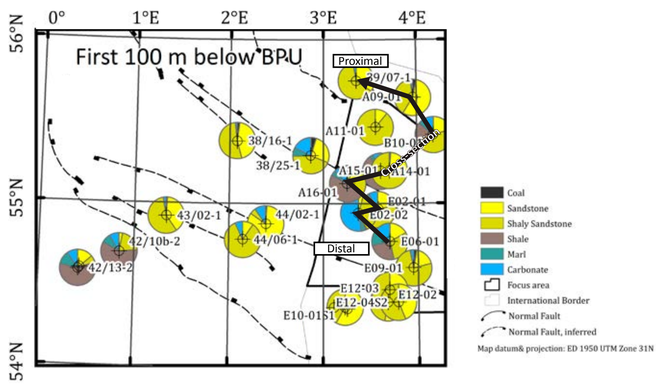

Figure 2. Lithological statistics of the first 100m below BPU. High chances of encountering sandstone in the Visean or Namurian directly below the BPU.

Source and charge

- **Lower Carboniferous Scremerston coals** are the most promising source rocks in the northern part of the study area
- In the southern part charge may occur from **Lower Carboniferous basinal shales** and laterally from **Upper Carboniferous Westphalian coals**

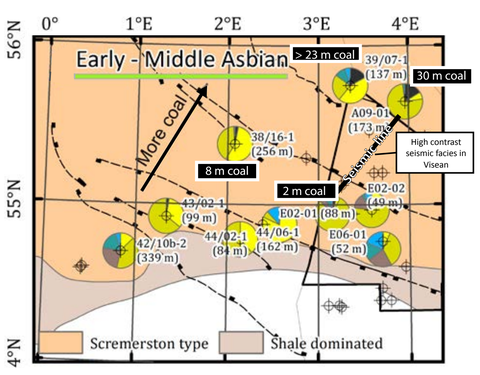

Figure 4. Palaeogeographic chart and lithological statistics for the Lower–Middle Asbian. Coal content increases towards the north. Legend presented in fig. 2 (UK palaeogeography after Kearsey et al., 2015, 2017 and UK structures after Arsenikos et al., 2015).

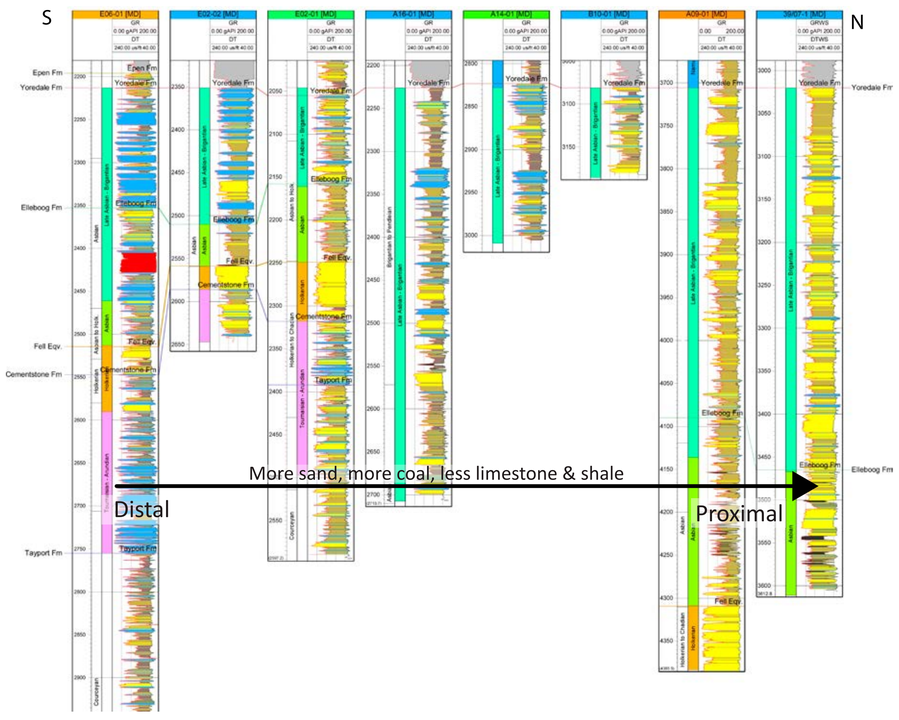

Figure 3. Well correlation panel of the Visean, illustrating lithological trends. The location and legend are presented in fig. 2.

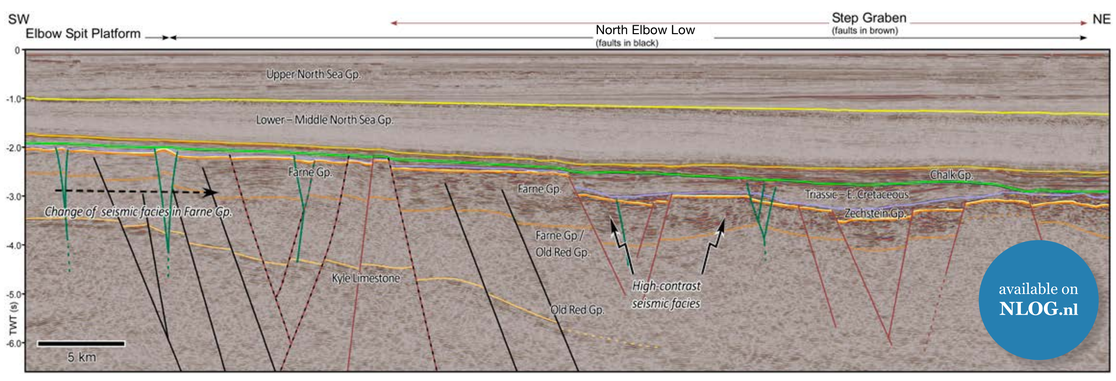

Figure 5. Seismic section across the North Elbow Low. The Visean Elleboog Formation has a high contrast seismic facies presumably caused by the presence of coals. Location presented in fig. 4. Public seismic line NSR32294.

Seal and trap

- Numerous fault and dip closures at BPU level, below Silverpit shales and Zechstein salt, which are proven regional seals
- Fault dip closures are dependent on juxtaposition sealing across faults
- Presence of intra Lower Carboniferous seal(s) would provide large upside

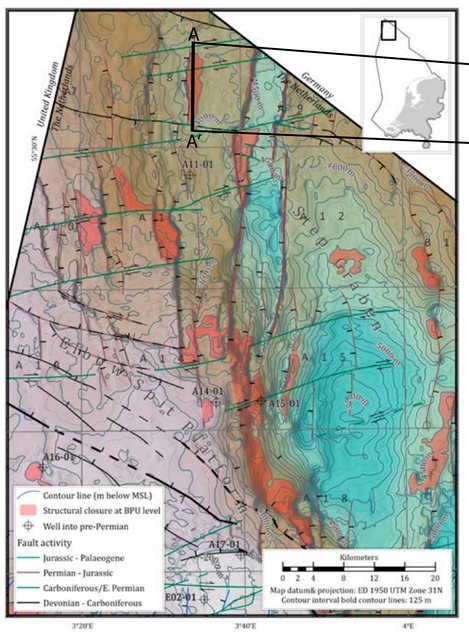

Figure 6. Structures at BPU level in the A quadrant, illustrating the types of structure that may form traps for hydrocarbons. The figure should not be regarded as a detailed assessment of the prospectivity of the area.

Lead

A8-Kilimanjaro lead

Reservoir	Namurian & Visean clastics
Seal	Silverpit shales and salts & Zechstein salt
Source	Scremerston coals

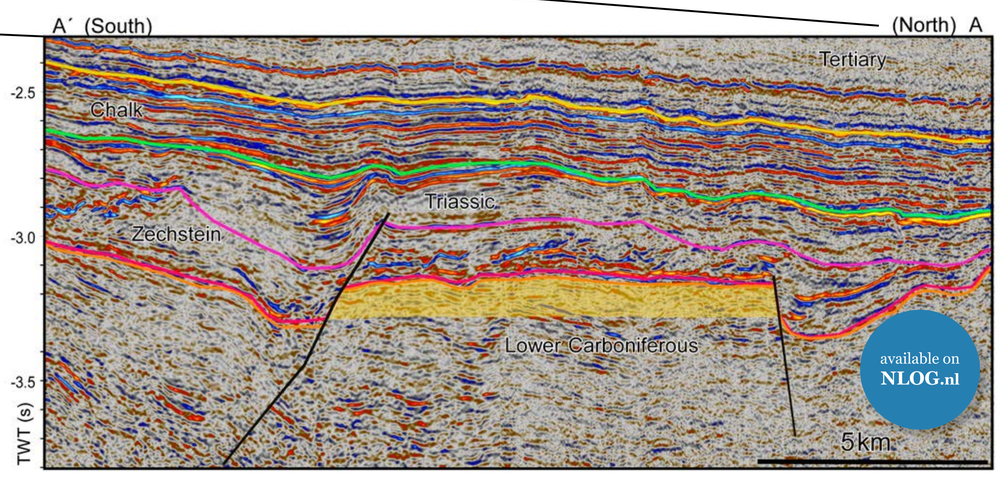

Figure 7. Example of a lead (A8-Kilimanjaro) at BPU level (public 3D seismic data). Location in fig. 6.

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